NA2012 WEEK 13 LAB EXERCISES

PROBLEM 1

$$A=\begin{bmatrix}1 & 2\\ 2 & 5\end{bmatrix}$$

a) Calculate the biggest eigenvalue of the matrix by hand by using power method

b) Calculate the smallest eigenvalue of the matrix by hand by using inverse power method

c) Check your result by using computer programs NA131, NA133

PROBLEM 2

$$A=\begin{bmatrix}\sigma_x & \tau_{xy} & \tau_{xz}\\ \tau_{yx} & \sigma_y & \tau_{yz}\\ \tau_{zx} & \tau_{zy} & \sigma_z\end{bmatrix}=\begin{bmatrix}10 & 4 & -6\\ 4 & -6 & 8\\ -6 & 8 & 14\end{bmatrix} MPa$$ Normal and shear stresses are given. Find the principle stresses

a) Biggest eigenvalue by power method

b) By Jacobi method

PROBLEM 3

Find the roots of $f(x)=x^3-3x^2+3x-1$. First create the companion matrix and then solve the eigenvalues by computer

NA2011 WEEK 12 HOMEWORKS

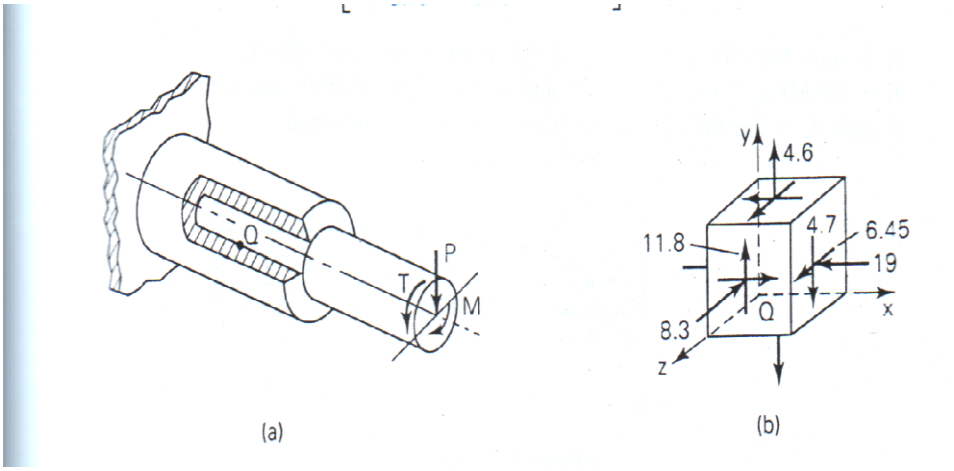
PROBLEM 1

A steel shaft is placed inside of a iron base as shown in the figure . T torsion and M bending moment is applied to the shaft. Under this forces stress matrix at point Q is as follows (Mpa)

-19	***-4.7***	***6.45***
-4.7	**4.6**	**11.8**
6.45	**11.8**	**-8.3**

Calculate the principle stresses at point Q

Note : Principle stresses are the eigenvalues of the matrix



a) Solve dominant principle stress (eigenvalue) by hand by using power method

b) Solve smallest principle stress (eigenvalue) by hand by using inverse power method

c) Solve all eigenvalues by computer by using Jacobi method

PROBLEM 2

Find the roots of $f(x)=x^4-4x^3+6x^2-4x+1$. First create the companion matrix and then solve the eigenvalues by computer

PROBLEM 3

Calculate largest and smallest eigenvales of the given matrix by using power method and inverse power method by hand

$$A = \begin{bmatrix} 2 & 8 & 10 \\ 8 & 4 & 5 \\ 10 & 5 & 17 \end{bmatrix}$$